

REMARKS

Please reconsider the present application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 1 and 5-10 were pending in this application. By way of this reply, claim 7 has been canceled without prejudice or disclaimer. Thus, claims 1, 5-6, and 8-10 are currently pending in this application. Of these claims, claims 1 and 6 are independent. The remaining claims depend, directly or indirectly, from claim 1.

Claim Amendments

By way of this reply, independent claims 1 and 6 have been amended to clarify the claimed invention. Support for the amendments to claim 1 may be found, *e.g.*, in paragraph [0044] and Fig. 3 of the published application. Also, claim 9 has been amended to clarify the claimed invention. Support for the amendments to claim 9 may be found, *e.g.*, in paragraph [0051]-[0054] of the published specification. No new matter has been added in these amendments.

Rejection(s) under 35 U.S.C. § 112

Claims 9 and 10 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner asserts that, in claim 9, it is not clear what is measure and what is determined in the claimed invention. By way of this reply, claim 9 has been

amended to clarify the claimed invention. Thus, to the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed for the reasons set forth below.

Referring to the specification and figures as an example, in one or more embodiments of the claimed invention, e.g., as shown in Fig 8, the changes ($\Delta \lambda 1$, $\Delta \lambda 2$) in resonance peak that occur when entering the light of various wavelengths at a constant angle of incidence and measuring the change in reflectivity before and after the reaction (FIG. 7(a)) are respectively influenced by both the change ($\Delta n1$) in the index of refraction based on the interaction between the acceptor (light detector) 107 and the ligand 108 at the surface of the metal layer 103, and the change ($\Delta n2$) in the index of refraction at the solvent part (sample solution 111). If $\Delta \lambda 1$ and $\Delta \lambda 2$ are respectively obtained as a function of $\Delta n1$, $\Delta n2$, $\Delta n1$ and $\Delta n2$ are calculated by solving the two equations. *Thus, the change of only at the metal layer surface ($\Delta n1$) excluding the change at the solvent part can be properly measured (see, Figs 7, 8, and paragraph [0051] of the published application).* Note that a wavelength of light is inversely proportional to a frequency of the light.

Accordingly, claim 9, as amended, includes, in part, “obtaining at least two resonance frequencies (e.g., $\lambda 1$ and $\lambda 2$ related factors) or resonance angles from the intensity of the totally reflected light detected with the light detector,” and “obtaining a change in a refraction index (e.g., $\Delta n1$ related factor) of the sample solution in a vicinity of the metal particles and at a distance of approximately a radius of the metal particles from a surface of the metal particles based on a change in one of the two resonance frequencies (e.g., $\Delta \lambda 1$ related factor) or the resonance angles

and based on a change in the other resonance frequency (e.g., $\Delta \lambda^2$ related factor) or the resonance angle.

In view of the above, it is clear that the claimed invention is directed to “*obtaining a change in a refraction index of the sample solution in a vicinity of the metal particles and at a distance of approximately a radius of the metal particles from a surface of the metal particles*” based on “*a change in one of the two resonance frequencies or the resonance angles and based on a change in the other resonance frequency or the resonance angle,*” “*obtained from the intensity of the totally reflected light detected with the light detector,*” and these features are fully supported by the specification and figures.

Accordingly, withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. § 102

Claims 1, 5, 6, and 8 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,331,276 (“Takei”). As discussed above, by way of this reply, independent claims 1 and 6 have been amended to clarify the claimed invention. Thus, to the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed for the reasons set forth below.

One or more embodiments of the claimed invention are directed to a surface plasmon resonance sensor chip, capable of obtaining information related with interaction of biomolecules such as protein and DNA. Referring to the specification and figures as an example, in one or more

embodiments of the claimed invention, a surface plasmon resonance sensor 101 includes a substrate 102 made of, *e.g.*, glass, a metal layer 103 formed on the substrate 102, a prism 104 arranged on the side of the substrate 102 not formed with the metal layer 103, an optical system 105, and a light detector 106. The optical system 105 enters the light to the interface of the metal layer 103 and the substrate 102 from a surface of the substrate 102 opposite to a surface attached to the metal layer 103. The light detector 106 measures the intensity of the light reflected at the interface of the metal layer 103 and the substrate 102. The optical system 105 may enter the light of a certain wavelength at various angles of incidence, or may enter the light of various wavelengths at a constant angle of incidence. In particular, in the embodiments, the light reflects at an interface of a metal layer 103 having convexities and a substrate 102 (from the back surface of the metal layer) (*see, e.g.*, paragraph [0044] and Fig. 3 of the published application).

Accordingly, independent claim 1, as amended, includes, in part, “*a transparent substrate with a flat surface on a first side; and a metal layer including a flat part of metal thin film formed on the flat surface of the substrate, ... wherein the transparent substrate comprises a surface for receiving a light on a second side opposite to the first side.*” Independent claim 6, as amended, requires substantially similar limitations. Due to the above-structural features, in the claimed invention, influence of the change in the index of refraction at the liquid solution part can be reduced in detection of the reflected light.

Takei fails to show or suggest at least these limitations. Instead, Takei discloses a plasmon resonance sensor in which a light passes through a sample fluid and reflects on the surfaces of a metal film 41 arranged on a transparent film 40 (*see, e.g.*, Figs. 1 and 9 of Takei). In the Office

Action, the Examiner attempts to equate the transparent film 40 of Takei with the transparent substrate of the claimed invention. Applicant respectfully disagrees.

In Takei, in contrast to the claimed invention, the light never enters from the surface of the thin film *opposite* to the surface contacted by the metal film. Instead, Takei's device is structurally designed to receive light *only from the metal film side*, which is inherently different from the structural feature of "the transparent substrate comprises a surface for receiving light on a second side opposite to the first side," now required by the claim. In fact, in Takei's device, the dominant part of the light necessarily passes through the liquid solution before reflecting on the metal film surface. Thus, unlike the claimed invention, influence of the change in the index of refraction at the liquid solution part can never be reduced in detection of the reflected light.

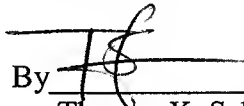
In view of the above, independent claim 1, as amended, is patentable over Takei, because Takei fails to show or suggest all of the limitations of the claim. By virtue of their dependence, claims 5, 6, and 8-10 are also allowable for at least the same reasons as amended claim 1. Accordingly, withdrawal of the rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 15115/240001).

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Respectfully submitted,

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